REMARKS

Claims 1-29 are pending in the application. Reconsideration of this application is respectfully requested.

Applicants appreciate the Examiner on August 22, 2003 indicating in a telephone conversation that he would not act on this application until after September 1, 2003 to provide an opportunity for Applicants' attorney to prepare and file this Supplemental Response before the application is taken up for continued examination.

Since the filing of the Request for Continued Examination on July 2, 2003, a translation has been obtained of the text, but not the claims, of WO 99/01995, which was cited in the Supplemental Information Disclosure Statement filed on January 13, 2003. A copy of this translation is appended hereto.

WO 99/01995 addresses the problem of communicating a message to a subscriber to two systems, namely a cellular telephone system (GMS) and a paging system (ERMES). The problem is how to communicate a paging message via ERMES to the subscriber who has roamed outside his home country to another country outside the range of the home country ERMES station. The problem is solved by finding the location of the subscriber's cell phone in the other country. This accomplished by the home country ERMES station communicating a page in the home country that is received by a device 7 that is capable of accessing the cell phone location data of the GMS system to find the location of the subscriber's cell phone. This data is sent to the home country ERMES station, which then sends the paging message to the other country's ERMES station for transmission in the other country to the subscriber's pager.

Thus, WO 99/01995 employs two different communication systems, one to transmit the data message to a pager and the other to find the location of the pager by finding the location of a cell phone associated with the pager. In contrast, Applicants use

one communication system to both find the location of the passive device and transmit a data message to the passive device.

Independent claims 1, 7 and 16 recite that the location of the passive device is identified by finding the location of a local service provider that has control over the comminations of an active device that is associated with the passive device and then transmitting the data message to that local service provider for transmission to the passive device. In WO 99/01995, the local service provider once found, has no further role. The home country ERMES station then uses the location information to send the data message to the cognizant other country ERMES station for transmission to the pager.

WO 99/01995 does not teach or disclose the passive device of claims 13 or 21 or the method of claim 26 that involves the passive device sending a message to a nearby active device for relay to a global registry and, once registered, the subsequent receipt of messages.

It is respectfully requested for the reasons set forth above that claims 1-29 are patentable over WO 99/0195 and that claims 1-29 are allowable for the reasons set forth in the Amendment that accompanied the Request for Continued Examination and that claims 1-29 be allowed and that this application be passed to issue.

Respectfully Submitted,

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Method for forwarding messages and appropriate device

The present invention concerns a method for forwarding messages in a telecommunications network. In particular, the present invention concerns a method for forwarding paging messages in a telecommunications network.

Different wireless telecommunications systems at present divide up the goodwill of consumers as well as the space of available radio frequencies. These systems can be differentiated into bidirectional systems, which are particularly adapted to voice transmission, and, in principle, unidirectional systems, which are often used for the transmission of alphanumeric messages to paging devices or pagers.

The most important bidirectional digital mobile telecommunications systems comprise at present, for example, the GSM system which for the most part operates with a radio frequency of 900 MHz, the PCN system which operates at a radio frequency of 1800 MHz, the NMT system (Nordic Mobile Telephone System), the TACS system (Total Access Mobile Telephone System) and the PDC (Personal Digital Cellular) system. The GSM system is at present offered by more than 120 network service providers, which operate in more than 80 countries. A subscriber generally subscribes to a single network service provider and can thus call or receive telephone calls while he is present in the geographic area administered by this network service provider, i.e., in an area which is covered by the radio antennas of the named network service provider. In order to broaden the geographic coverage offered to their subscribers, most network service providers conclude a certain number of bilateral agreements amongst

themselves, which makes it possible for subscribers to use their cell phones in the geographic area which is covered by all the network service providers with which an agreement has been concluded. Such a possibility is known under the name roaming, and is described in: "International roaming in digital cellular networks", by I. Brini et al., CSELT technical reports, December 1992, Vol. 20, No 6, pages 531-536. A network service provider that wishes to offer roaming possibilities to its subscribers generally works with a so-called location table ("location register"), which contains information dependent on the instantaneous location of each subscriber. The roaming process is extensively automated: as soon as a subscriber uses his calling device in a geographic area other than the one which is covered by the network service provider to which the subscriber has subscribed, he is recognized by means of an identification stored, for example, in a chip card (SIM card, "subscriber identification module"). His location as well as other data are stored in a visitors location table (VLR, "Visitors Location Registry") administered by the network service provider that is responsible for the geographic area that is visited, and transmitted to the network service provider with which the subscriber is registered (home network service provider or "home operator"). As soon as a subscriber is recognized in a visited network, this is noted by his home network service provider and his specific calls and messages are automatically sent to him.

In addition to classical telephone or fax connections, the GSM system also permits the sending of short messages or data between calling devices and an SMS-C ("Short Message Service Central") central station. These short messages

can be displayed, for example, on a small liquid crystal display on the mobile telephone.

The ERMES system ("Enhanced Radio Message System") is a frequently used, unidirectional mobile telecommunications system. It is used particularly to send messages, which are displayed, for example, on the liquid crystal display of a pager. Although the system does not permit either interactive dialog or conversations, it offers the advantage of a better geographic coverage than the GSM system, particularly inside buildings. For this reason, many subscribers use a cell phone of the GSM type and a pager system of the ERMES type at the same time, in order to be reachable even inside buildings.

The ERMES system is at present offered by more than 40 network service providers, which have concluded a certain number of roaming agreements. A subscriber can receive messages if he is present in a geographic area that is administered by a network service provider that has concluded a roaming agreement with his home network service provider. Such agreements are concluded, for example, between the plurality of network service providers that are signatories of the "ERMES Memorandum of Understanding (MoU)". In order to receive messages in another area, a subscriber must inform his home network service provider beforehand of his travel plans or his whereabouts. The home network service provider then takes the necessary measures so that during the arranged travel period, the subscriber's specific messages are transmitted to him in the visited geographic areas. In the ERMES system, different character sets are provided, which permit the subscriber to receive messages that are displayed

in his own language and with the characters corresponding to his language, even if he is traveling abroad.

This type of roaming is less flexible when compared to the mobile telephone and requires that the subscriber take the initiative. This method can be troublesome for the subscriber and represents a source of error due to the manual input of roaming data.

An object of the present invention is to create an improved method for forwarding messages to other networks, particularly a method which permits improved roaming possibilities.

This object is solved by the features indicated in the characterizing parts of patent claims 1 and 7.

This object according to the invention is particularly achieved for subscribers who simultaneously subscribe to a first GSM communications system and to a second communications system, for example, simultaneously to a mobile wireless system of the GSM, DCS or NMT type and to a message transmission system of the ERMES type. According to the method of the invention, at least certain messages transmitted in a second ERMES communications system are forwarded with the use of the information at the receiver, which indicates the instantaneous geographic location of said receiver. This information is stored in a location register administered by the network service provider of the first communications system. In the particular case, if the first communications system is a GSM system and the second is an ERMES system, ERMES messages are forwarded

to a receiver abroad with the use of information of the location of the subscriber, which is stored in the location register of the GSM system.

The method according to the invention is conducted preferably by means of a device which has at least one programmable machine and means for receiving a message sent in a second communications system, means of reading a location register administered by the network service provider of the first communications system and means for retransmission of messages with an address determined by the location register, in order to permit the forwarding of messages to the receiver, when the receiver is not found in the geographic area administered by the home network service provider. The location register contains information which is dependent on the current location of the subscriber, at least for certain subscribers of the network service provider of the first communications system. Roaming means are provided in order to update the location register, if a subscriber with his first calling device moves to a geographic area other than the one which is administered by the named network service provider.

The method according to the invention is preferably essentially conducted by means of an additional device, which is capable of receiving ERMES messages via the air interface I1, expanding the message address with the location information and entering it again into the input of the paging system (I5), whereby the air interface I1 and interface I5 are standardized in the ERMES system. The paging central station, the distribution networks or the base station of the ERMES system need not be specifically adapted in order to conduct the method according to the invention. The method according to the invention is preferably

conducted without modification of the switching center for the mobile service (MSC, mobile switching center) of the first communications system, the GSM system.

For example, when a subscriber travels to another country with his GSM cell phone and his ERMES pager, in this way, the ERMES messages which are specific to him, can be automatically forwarded to his pager, as soon as the location register administered by the GSM home network service provider has been updated with the information updated by the roaming capabilities of the GSM system.

A call diversion method for subscribers who use an ERMES pager and a GSM wireless phone at the same time is very well known. This service permits the subscriber to be able to divert calls specific to his GSM mobile phone to his pager. If the (GSM) subscriber is called, a message appears on his (ERMES) pager. The subscriber can then activate his GSM device and answer the phone call. Communications can be received in this way, even if the subscriber is found in an environment that is covered by the ERMES network, but not by the GSM network, for example, inside buildings. This service, however, does not involve the extension of roaming for the ERMES system. Also, this service is implemented only upon request of the subscriber.

EP 0 660,624 describes a roaming method, which permits transmitting messages to pagers which are connected to a wireless phone. A physical connection is necessary between the pager and the wireless phone. This method consequently

cannot be applied to transmit messages to subscribers who are equipped with traditional pagers and wireless phones, which cannot be physically connected.

US 5,414,750 describes a system for producing a telephone connection with a subscriber equipped at the same time with a pager and a mobile phone, even if the instantaneous location of the subscriber is unknown to the mobile phone system. In this case, a message is sent to the pager, since it is assumed that it is easier to reach him therewith. A physical connection is established between the pager and the mobile phone. The mobile phone is programmed in such a way that it sends out a message which permits it to be located in the visited geographic area. This system also requires a physical connection between the pager and the mobile phone.

WO 92/09178 describes another combination of a pager and a mobile phone. The mobile phone communicates its geographic location to the pager. The pager uses this information to activate only receiving circuits that operate in suitable frequency bands, which can be received in this geographic location.

The invention will be better understood by means of the description illustrated by the attached figures. Here:

Fig. 1 shows a simplified block diagram of a total paging network based on the ERMES standard, with which the method of the invention is conducted.

Fig. 2 shows a flow chart of an example of a method for transmitting messages according to the invention.

Fig. 3 shows a flow chart of a second example of a method for transmitting messages according to the invention.

Although the description and the figures refer more specifically to the special case of forwarding ERMES messages to subscribers who also subscribe to a GSM system, it is important to understand that the invention also concerns the forwarding of messages in any type of second communications network to subscribers who also subscribe to a first communications system, which offers improved roaming possibilities.

The reference character 1 denotes an input device for messages which is provided for a calling party to send a message via the ERMES network to a subscriber equipped with a pager 12 and a cell phone 81, in this example, of the GSM type. The calling party may not know the instantaneous location of the subscriber. The calling party can use different means for introducing a message into the ERMES network. For example, he can call the ERMES network service provider by telephone, type in dial pulses on the keypad of his telephone device, or use a special menu on Videotext or Minitel, a cell phone of the GSM type, the ISDN network, etc. In the figure, the calling party sends his message 2 by means of a computer 1 and a modem. Message 2 contains a telegram 23, for example, an alphanumeric communication, such as, for example, "Call home" and a calling number 22. Corresponding to the calling number 22, the receiver identification 30 (RIC, radio identification code), an alarm type 31 as well as the receiving zone 33 are established in the paging central station 3. The subscriber's number 32 remains unchanged. The ERMES system provides eight different types of alarm,

which can be sent out, whereby each alarm produces, for example, a different tone on pager 12, which receives the message. Certain alarms are reserved for special, standardized services offered to subscribers. With the allocation of alarm type 8 to the calling number of a subscriber who may be found outside his geographic home area, i.e., the geographic area which is administered by the network service provider to which the subscriber subscribes, the call can be forwarded automatically. This variant of the invention permits the caller to select the same calling number, which is also always the instantaneous location of subscriber 12. The sending of messages with an alarm 8 can be subject to the payment of a special charge, depending on the rate policy selected by the network service provider.

Message 2 is communicated via an interface I6 (user dialogue interface) and an interface I5 (access interface) to a paging central station 3 (PNC, paging network controller), which is responsible for accepting calls, processing calls, and for network administration.

The paging central station or network controller 3 is connected to the paging area controller (PAC) 3' via an interface I3. The PAC 3' conducts synchronization between adjacent base stations 5, with which it is connected via an interface I2, which transmits the control and alarm information between the PAC 3' and the base stations 5 distributed in the geographic home area. If the base stations 5 are distanced from the PAC 3', the interface I2 can utilize different transmission networks 4.

If receiver 12 is found in the geographic home area, which is covered by the base station 5 of its home network service provider, it receives the message of the calling party 1 in this way.

The message sent out by base station 5 is received by receiving means 6. The receiving means are connected to a device 7, which has at least one programmable machine, for example, a work station. The device 7 comprises a buffer 70 for the temporary storage of the received message, including the alarm type 71, the RIC 72 and the previously mentioned data telegram 73.

The device 7 also comprises reading means 74 for interrogating a subscriber location register 80. The reading means 74, for example, consists of an information processing module and permits questioning the identity of the receiver of the message in the storage means 70 and interrogating a database 77, which contains links between the identity of the receiver coded in the ERMES message which is obtained and the MSISDN subscriber number (mobile subscriber identity) of this same receiver in the first communications system (GSM). The reading means utilizes this MSISDN number in order to interrogate a location register 80 in a switching center for mobile services (MSC, mobile switching center) 8. The mobile switching center 8 administers the connections in the GSM mobile telecommunications system. The location register 80 contains information, which corresponds to the instantaneous location of all subscribers of the GSM network or at least the location of subscribers, who are found at the moment in a geographic area other than the area administered by the network service provider responsible for the mobile switching center 8.

The device 7 comprises, among other features, a means 76 for resending the message 9 via an interface I5 to the paging central station or network controller 3. The message 9 which is retransmitted contains the corresponding subscriber number RN 90, expanded by the location information 92, which corresponds to the instantaneous location of the user 12, as well as a data telegram 93. This message is sent to the paging central station or network controller 3, which resends it via an interface I4 to the receiver 12 in the indicated geographic area of another network.

An example of a message forwarding method according to the invention will now be discussed in reference to Figure 2.

The beginning of the method is indicated by the number 100. The calling party 1, who wants to send a message to a user 12, for example, enters it on a personal computer and transmits it in the course of step 101 to the paging central station or network controller 3, for example, by means of a modem and via an interface I6/I5. The message 2 is then received by the paging central station or PNC 3 (step 102) and coupled to a receiver identification 30 (RIC), a receiving area 33 as well as to the alarm type 8. The alarm type 8 characterizes the messages for subscribers who have subscribed to this novel means for forwarding messages. Then the message is transmitted via the interface I3 to the paging area controller PAC 3', then via the interface I2 to the base stations 5, which transmit the message during step 103 via the air interface I1. The transmitted message is then received in the course of step 104 by the receiving means 6 and forwarded to device 7.

The message obtained by the receiving means 6 is intermediately stored in the course of step 105 in buffer 70. The device of step 105' gets the "oldest" message from buffer 70, which is named subsequently as the "current message" 78 and is further processed by the information processing program conducted by the device 7. In the course of step 106, the information processing program conducted by the programmable device 7 verifies the alarm type allocated to the current message 78. If the alarm type 8 is different, then the current message as well as the corresponding message in buffer 70 are deleted in step 107 and the method is terminated (step 108).

On the other hand, if the message has an alarm of the type 8, the program continues with step 109, during which the current message 78 is compared with a temporary storage register 75. If there is agreement, i.e., if the current message and the message in the temporary storage register 75 correspond, then the current message and the message stored in the buffer 70 are deleted (step 107) and the method is terminated (step 108). On the other hand, if the current message 78 does not correspond to the message stored in the temporary storage register 75, then the current message 78 is copied into the temporary storage register 75 in the course of step 110. Before the routine for the determination of the location of the receiver, the modification of the geographic area and the message forwarding is begun, the message in buffer 70, which was previously copied in step 110 into the temporary storage register 75, is deleted in the course of step 111.

The program found in device 7 then continues with step 113, during which the RIC is read from the current message 78. In step 114, the program consults the die RIC/MSISDN register 79, in which the RIC with the corresponding MSISDN is entered for all subscribers with the additional service of "forwarding messages". Permanent interfaces 13 between the RIC/MSISDN register and the subscriber administration system of the paging system 14 and the subscriber administration system of the mobile phone system 15 assure a continually current and followed-up state of the same. During the consultation in step 114, upon asking for the RIC, the program clearly learns the MSISDN number belonging thereto. During step 115, with the use of said MSISDN number, the interrogation means 74 reads another location register 80 (HLR, home locating register), which is stored, for example, in a mobile switching center (MSC) 8. The location register 80 communicates to the interrogation means 73, as a response, the whereabouts of the same subscriber in the first communications system (GSM) in the form of a locating area (LA). In step 116, the program passes on the obtained LA to the correspondence register 700. The correspondence register 700 contains a first list, in which all LAs of the cooperating mobile network are contained. This list references a second list, in which all geographic areas are filed in the form of a geographic area (GA), which are found in the region provided for by the cooperating ERMES service providers, with whom an ERMES roaming agreement has been concluded and for which the additional service of "forwarding messages" is offered. When new roaming partners of the ERMES paging service system are added, the lists for the new LAs and GAs are

expanded and provided with the corresponding links, i.e., the LAs reference the required GAs. In the course of step 117, it is now the task of the program to determine whether the current message is modified and can or must be forwarded. A message need only be retransmitted, if:

Consultation of the correspondence register 700 results in the fact that the receiver is found at the moment in a geographic area (LA) other than its home area, for example, the receiver is found abroad; [and]

the receiver according to the correspondence register 700 is found in a geographic area (LA), for example, in a country with which a roaming agreement has been concluded.

If at least one of these two conditions is not fulfilled, the program continues with step 119, in which the current message 78 is deleted, and terminates with step 120.

However, if these two conditions are fulfilled, it is possible for the program, in the course of step 121, to obtain the corresponding GA by consulting the correspondence register 700 by means of the valid LA . By step 122, the program replaces the PA information in the message 78 with the GA information, which was obtained by step 121.

The information processing program modifies the current message 78 by deleting the data field with the paging area (PA) information contained therein and in its place inserts a new data field, which contains the COD information that was obtained by step 121.

In step 123, forwarding means 76 in device 7 prepares a new message 9, but now with the modified or preferably expanded transmission address, which corresponds to the location information derived from the location register 80 of the GSM system. For example, the retransmitted message 9 may contain location information (GA) 92, which corresponds to the instantaneous location of the subscriber abroad. This message is sent to paging central station or PNC 3, for example, via interface I5 of the ERMES system.

In step 124, the corrected message 9 received by the paging central station (PNC) 3 is retransmitted taking into consideration the receiver location information (GA) 92. Preferably, this message is transmitted in the conventional way via interface I3 to the paging area controller (PAC) 3' and then via an interface I4, which is particularly specified for international exchange and is based on the known protocol X.25, and is again transmitted to another ERMES network service provider (roaming partner), which is responsible for the geographic area, in which the receiver is found at the moment and which has concluded a roaming agreement. The message received by this other network service provider on its national network 10 is then transmitted via an interface I1 by a base station 11, which is similar to base station 5 and thus can be received by pager 12 of the receiver.

The specification of the ERMES system prescribes that if a message is transmitted in a geographic area administered by another network service provider that has concluded a roaming agreement, a message is transmitted in parallel in the geographic home area. If the second communications system is an

ERMES system, message 9 must consequently also be retransmitted during this step 124 by the base stations 5 in the geographic home area. The content of this message is identical to the content of the message which was previously transmitted.

The method concludes with step 125.

This variant, which utilizes an alarm specified in advance, for example, alarm 8 of the ERMES system, monopolizes one of the available alarms. It is also impossible to send the same message twice to the same receiver during the pre-determined temporary storage time of the temporary storage register 75.

Figure 3 shows a flow chart of a second variant of the method, which permits it to avoid these disadvantages. This variant of the method can be operated on a device similar to the one shown in Fig. 1.

Steps 200 to 201 of the method according to this variant are identical to steps 100 to 101 of the method discussed in reference to Figure 2. A conventional paging area (PA) is allocated in the subscriber profile to subscribers who have not subscribed to the additional service of "forwarding messages". In this case, the messages reach base stations 11 via the switching center 10 and are transmitted there via the air interface I1 and are received by the receiver equipment.

A fictitious paging area (PA) is allocated in the subscriber profile according to the invention to the subscribers with the additional service of "forwarding messages" (step 202). As a consequence of the fictitious PA, messages for these

subscribers are delivered to a special base station 5, which is reserved expressly for this subscriber group and are not transmitted into the ether with its interface I1, but rather the messages are forwarded directly via cable and attenuator to the receiving means 6 (step 203), which conveys them to device 7 (step 204).

The messages obtained by receiving means 6 are processed as described above, with the difference that in this second variant, filtering need not be conducted by means of alarm 8, since here, based on the allocation of fictitious subscriber numbers, the messages for the subscribers with the additional service of "forwarding messages" in the fictitious paging area reach receiving means 6 in an exclusive manner. This means that the storage management, the receiver location determination and the forwarding of messages are configured exactly the same as was described under the first variant with the alarm method.

In the course of step 205, device 7 stores the message obtained in the storage cell 78 as the data string "current message".

In step 209, the radio identification address of the receiver of the message is determined from the content of the current message 78 by means of register 79 in device 7. In step 214, by means of the correspondence register 79, this means determines the MSISDN number of the subscriber in the GSM network of the receiver and interrogates the location register 80 by means of this MSISDN number, in order to determine the current location of the receiver.

In step 215, the same test is conducted, which was discussed in reference to Figure 2, if the message is to be retransmitted in another geographic area. If the

test result is positive (for example, since the receiver is abroad), the program proceeds to step 219, in which the COD for the paging area (PA) of the current message 78 is added in order to transmit the message further depending on this geographic area. The program then proceeds to step 221.

If, at the end of step 215, the program determines that the message need not be further transmitted outside the geographic home area, the program proceeds directly to step 221.

In the course of step 221, the standard number for the subscriber in the home area is determined by means of the paging system-subscriber administration system 14.

The message is then retransmitted in step 222 by the forwarding means 76 via the interface I5 to the paging central station (PNC) 3 with the standard subscriber number determined earlier. A standard paging area (PA) is allocated to this standard subscriber number in the conventional manner. This paging central station (PNC) then further transmits the message via the paging area controller 3' either only in the geographic home area, or, if, according to the location register 80, the receiver is found in another geographic area, at the same time to the geographic home area and to this other geographic area. The method then concludes with step 223.

This second variant offers the advantage of a simpler programming of device 7 by only processing messages therein for subscribers who have subscribed to this expanded roaming possibility. The device 7 thus can consist consequently of a

simpler and more economical work station. A temporary register 75 is not necessary. However, each message, which is specific for a subscriber who has subscribed to this service, passes twice through the paging central station (PNC) 3, which is highly loaded thereby. The transmission time for messages to this subscriber is prolonged, if he is found in his geographic home area. In this case, in fact, the messages can only be received in the second transmission with the standard subscriber number, if the long-distance code number has been corrected. In addition, two subscriber numbers are required for each subscriber who has subscribed to this service: a standard number and a fictitious one.

In the two variants discussed by means of Figures 2 and 3, the location register 80 of the GSM system is interrogated for each ERMES message transmission which is specific for an authorized subscriber found in another geographic area. The ERMES system does not store where the receiver is found; one speaks of "follow-me roaming". This configuration makes an adaptation of the ERMES system superfluous, particularly an adaptation of the paging central station (PNC) 3 and the paging area controller 3'.

If adaptations of the second communications system do not present difficulties, it may be of advantage to modify it only so that the system stores the location of the receiver after each retransmitted message. For this purpose, a location register with information of users of the second service (ERMES) can be provided, which is updated with the location information taken from location register 80 (in the GSM system).

Although the preceding description essentially refers to the combined use of a GSM cell phone and an ERMES pager, it is important to see that the invention can find application also in other types of wireless telephones and pagers, particularly with the combined use of an NMT phone and an ERMES pager. Since the NMT system does not provide the possibility for transmitting shorter messages, this combination has proven particularly advantageous. The invention can also find application for the simultaneous use of two wireless phone systems.